

THAT WHICH IS CLAIMED:

1. A method for beneficiating slag, comprising:  
mixing the slag with water to form a slurry;  
5 screening the slurry through a first screen to remove a first portion of material;  
screening the slurry subsequent to said first screening step through a second  
screen to remove a second portion of material; and  
wherein the second portion of material has a carbon content less than about 5%.
- 10 2. A method according to Claim 1 wherein the second portion of material has  
a carbon content less than about 1%.
3. A method according to Claim 1 wherein the first portion of material has a  
particle size exceeding approximately .5 inches.
- 15 4. A method according to Claim 1 wherein the second portion of material has  
a particle size of between approximately .5 inches and approximately 840  $\mu\text{m}$ .
5. A method according to Claim 1 further comprising dewatering a slurry  
20 prior to said mixing step.
6. A method according to Claim 1 wherein said mixing step comprises  
agitating the slurry.
- 25 7. A method according to Claim 1 further comprising spraying a fluid onto at  
least one of the first and second screens concurrently with said corresponding first and  
second screening steps.

8. A method according to Claim 1 further comprising vibrating at least one of the first and second screens concurrently with said corresponding first and second screening steps.
- 5 9. A method according to Claim 1 further comprising screening the slurry subsequent to said second screening step through a centrifuge to remove a third portion of material.
- 10 10. A method according to Claim 9 wherein the third portion of material has a particle size of between approximately 840  $\mu\text{m}$  and approximately 45  $\mu\text{m}$ .
11. A method according to Claim 9 further comprising using the third portion of material as at least one of a fuel product and an adsorbent carbon.
- 15 12. A method according to Claim 9 further comprising thickening the slurry subsequent to said third screening step using an anionic flocculant selected from the group consisting of polyacrylamide and acrylamide copolymers to thereby remove a fourth portion of material from the slurry.
- 20 13. A method according to Claim 12 further comprising using a pH modifier selected from the group consisting of sodium hydroxide and ammonium hydroxide to clarify the water.
- 25 14. A method according to Claim 12 wherein the fourth portion of material has a particle size of less than approximately 45  $\mu\text{m}$ .
15. A method according to Claim 12 further comprising processing the fourth portion of material using a belt filtering press.

16. A method according to Claim 15 further comprising using the processed fourth portion of material as a fuel product.
17. A method according to Claim 1 further comprising screening the slurry subsequent to said second screening step using a hydrocyclone to remove a third portion of material from the slurry.
18. A method according to Claim 17 wherein the third portion of material has a particle size of between approximately 840  $\mu\text{m}$  to approximately 75  $\mu\text{m}$ .
19. A method according to Claim 17 further comprising dewatering the third portion of material subsequent to said third screening step using a centrifuge.
20. A method according to Claim 17 further comprising using the third portion of material as at least one of an adsorbent carbon and fuel product.
21. A method according to Claim 17 further comprising thickening the slurry subsequent to said third screening step using an anionic flocculant selected from the group consisting of polyacrylamide and acrylamide copolymers to thereby remove a fourth portion of material from the slurry.
22. A method according to Claim 21 wherein the fourth portion of material has a particle size of less than approximately 75  $\mu\text{m}$ .
23. A method according to Claim 21 further comprising using a pH modifier selected from the group consisting of sodium hydroxide and ammonium hydroxide to clarify the water.
24. A method according to Claim 21 further comprising processing the fourth portion of material using a belt filtering press.

25. A method according to Claim 24 further comprising using the processed fourth portion of material as a fuel product.

26. A method for beneficiating slag, comprising:  
5 mixing the slag with water to form a slurry;  
screening the slurry through a first screen to remove a first portion of material;  
screening the slurry subsequent to said first screening step through a second  
screen to remove a second portion of material;  
screening the slurry subsequent to said second screening step through a centrifuge  
10 to remove a third portion of material; and  
wherein the second portion of material has a lower carbon content than the third  
portion of material.

27. A method according to Claim 26, wherein the second portion of material  
15 has a carbon content less than about 5%.

28. A method according to Claim 26 wherein the first portion of material has a  
particle size exceeding approximately .5 inches.

29. A method according to Claim 26 wherein the second portion of material  
20 has a particle size of between approximately .5 inches and approximately 840  $\mu\text{m}$ .

30. A method according to Claim 26 further comprising dewatering a slurry  
prior to said mixing step.

31. A method according to Claim 26 wherein said mixing step comprises  
25 agitating the slurry.

32. A method according to Claim 26 further comprising spraying a fluid onto at least one of the first and second screens concurrently with said corresponding first and second screening steps.
- 5 33. A method according to Claim 26 further comprising vibrating at least one of the first and second screens concurrently with said corresponding first and second screening steps.
34. A method according to Claim 26 wherein the third portion of material has  
10 a particle size of between approximately 840  $\mu\text{m}$  and approximately 45  $\mu\text{m}$ .
35. A method according to Claim 26 further comprising using the third portion of material as at least one of a fuel product and an adsorbent carbon.
- 15 36. A method according to Claim 26 further comprising thickening the slurry subsequent to said third screening step using an anionic flocculant selected from the group consisting of polyacrylamide and acrylamide copolymers to thereby remove a fourth portion of material from the slurry.
- 20 37. A method according to Claim 36 further comprising using a pH modifier selected from the group consisting of sodium hydroxide and sodium hydroxide to clarify the water.
38. A method according to Claim 36 wherein the fourth portion of material  
25 has a particle size less than approximately 45  $\mu\text{m}$ .
39. A method according to Claim 36 further comprising processing the fourth portion of material using a belt filtering press.

40. A method according to Claim 39 further comprising using the processed fourth portion of material as at least one of a fuel product and a adsorbent carbon.

41. A method for beneficiating slag, comprising:  
5 mixing the slag with water to form a slurry;  
screening the slurry through a first screen to remove a first portion of material;  
screening the slurry subsequent to said first screening step through a second screen to remove a second portion of material;  
screening the slurry subsequent to said second screening step using a  
10 hydrocyclone to remove a third portion of material from the slurry; and  
wherein the second portion of material has a lower carbon content than the third portion of material.

42. A method according to Claim 41, wherein the second portion of material  
15 has a carbon content less than about 5%.

43. A method according to Claim 41 wherein the first portion of material has a particle size exceeding approximately .5 inches.

20 44. A method according to Claim 41 wherein the second portion of material has a particle size of between approximately .5 inches and approximately 840  $\mu\text{m}$ .

45. A method according to Claim 41 further comprising dewatering a slurry prior to said mixing step.

25

46. A method according to Claim 41 wherein said mixing step comprises agitating the slurry.

47. A method according to Claim 41 further comprising spraying a fluid onto at least one of the first and second screens concurrently with said corresponding first and second screening steps.
- 5 48. A method according to Claim 41 further comprising vibrating at least one of the first and second screens concurrently with said corresponding first and second screening steps.
- 10 49. A method according to Claim 41 wherein the third portion of material has a particle size of between approximately 840  $\mu\text{m}$  to approximately 75  $\mu\text{m}$ .
50. A method according to Claim 41 further comprising dewatering the third portion of material subsequent to said third screening step using a centrifuge.
- 15 51. A method according to Claim 41 further comprising using the third portion of material as at least one of an adsorbent carbon and a fuel product.
- 20 52. A method according to Claim 41 further comprising thickening the slurry subsequent to said fourth screening step using an anionic flocculant selected from the group consisting of polyacrylamide and acrylamide copolymers to thereby remove a fourth portion of material from the slurry.
- 25 53. A method according to Claim 52 wherein the fourth portion of material has a particle size of less than approximately 75  $\mu\text{m}$ .
54. A method according to Claim 52 further comprising using a pH modifier selected from the group consisting of sodium hydroxide and ammonium hydroxide to clarify the water.

55. A method according to Claim 52 further comprising processing the fourth portion of material using a belt filtering press.

56. A method according to Claim 55 further comprising using the processed  
5 fourth portion of material as at least one of a fuel product or adsorbent carbon.

57. A system for beneficiating a slag slurry into usable portions, comprising:  
a first screen for removing a first portion of material from the slurry;  
a second screen for removing a second portion of material from the slurry; and  
10 wherein the second portion of material has a carbon content of less than about  
5%.

58. A system according to Claim 57 wherein the second portion of material  
has a carbon content less than about 1%.

59. A system according to Claim 57 wherein the first portion of material has a  
particle size exceeding approximately .5 inches.

60. A system according to Claim 57 wherein the second portion of material  
20 has a particle size of between approximately .5 inches and approximately 840  $\mu\text{m}$ .

61. A system according to Claim 57 further comprising a blunger for agitating  
the slurry.

25 62. A system according to Claim 57 further comprising at least one sprayer for  
spraying fluid onto at least one of the first and second screens.

63. A system according to Claim 57 further comprising at least one vibrator  
for vibrating at least one of said first and second screens.



64. A system according to Claim 57 further comprising a centrifuge for removing a third portion of material from the slurry.

5 65. A system according to Claim 64 wherein the third portion of material has a particle size of between approximately 840  $\mu\text{m}$  to approximately 45  $\mu\text{m}$ .

66. A system according to Claim 57 further comprising a thickener for removing a fourth portion of material from the slurry.

10 67. A system according to Claim 66 further comprising a belt filtering press for dewatering the fourth portion of material.

68. A system according to Claim 57 further comprising a hydrocyclone for removing a third portion of material from the slurry.

15 69. A system according to Claim 68 wherein the third portion of material has a particle size of between approximately 840  $\mu\text{m}$  to approximately 75  $\mu\text{m}$ .

20 70. A system according to Claim 68 further comprising a centrifuge for dewatering the third portion of material.

71. A system according to Claim 68 further comprising a thickener for removing a fourth portion of material from the slurry.

25 72. A system according to Claim 71 further comprising a belt filtering press for dewatering the fourth portion of material.

73. A system for beneficiating a slag slurry into usable portions, comprising:  
a first screen for removing a first portion of material from the slurry;  
a second screen for removing a second portion of material from the slurry;  
a centrifuge for removing a third portion of material from the slurry; and  
5 wherein the second portion of material has a lower carbon content than the third  
portion of material.

74. A system according to Claim 73 wherein the second portion of material  
has a carbon content less than about 5%.  
10

75. A system according to Claim 73 wherein the first portion of material has a  
particle size exceeding approximately .5 inches.

76. A system according to Claim 73 wherein the second portion of material  
15 has a particle size of between approximately .5 inches and approximately 840  $\mu\text{m}$ .

77. A system according to Claim 73 further comprising a blunger for agitating  
the slurry.

78. A system according to Claim 73 further comprising at least one sprayer for  
20 spraying fluid onto at least one of the first and second screens.

79. A system according to Claim 73 further comprising at least one vibrator  
for vibrating at least one of said first and second screens.  
25

80. A system according to Claim 73 wherein the third portion of material has  
a particle size of between approximately 840  $\mu\text{m}$  and approximately 45  $\mu\text{m}$ .

81. A system according to Claim 73 further comprising a thickener for  
30 removing a fourth portion of material from the slurry.

82. A system according to Claim 81 further comprising a belt filtering press for dewatering the fourth portion of material.

5 83. A system for beneficiating a slag slurry into usable portions, comprising:  
a first screen for removing a first portion of material from the slurry;  
a second screen for removing a second portion of material from the slurry;  
a hydrocyclone for removing a third portion of material from the slurry; and  
wherein the second portion of material has a lower carbon content than the third  
portion of material.

10

84. A system according to Claim 83 wherein the second portion of material has a carbon content less than about 5%.

15 85. A system according to Claim 83 wherein the first portion of material has a particle size exceeding approximately .5 inches.

86. A system according to Claim 83 wherein the second portion of material has a particle size of between approximately .5 inches and approximately 840  $\mu\text{m}$ .

20 87. A system according to Claim 83 further comprising a blunger for agitating the slurry.

88. A system according to Claim 83 further comprising at least one sprayer for spraying fluid onto at least one of the first and second screens.

25

89. A system according to Claim 83 further comprising at least one vibrator for vibrating at least one of said first and second screens.

30 90. A system according to Claim 83 wherein the third portion of material has a particle size between approximately 840  $\mu\text{m}$  to approximately 75  $\mu\text{m}$ .

91. A system according to Claim 83 further comprising a centrifuge for dewatering the third portion of material.

92. A system according to Claim 83 further comprising a thickener for  
5 removing a fourth portion of material from the slurry.

93. A system according to Claim 92 further comprising a belt filtering press for dewatering the fourth portion of material.